

POLLUTANT REMOVAL EFFICIENCIES FOR TYPICAL STORMWATER MANAGEMENT SYSTEMS IN FLORIDA

Presented at the
Fourth Biennial Stormwater Research Conference
Clearwater, FL

October 18-20, 1995

Sponsored By:

The Southwest Florida Water Management District

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Comparison of Treatment Efficiencies for Stormwater Management Systems

A comparison of treatment efficiencies for typical stormwater management systems used in the State of Florida is given in Table 8 based on information obtained in the literature review. In cases where a range of removal efficiencies are presented in technical reports related to a particular stormwater management technique, the mid-point of the range is given in Table 8 for comparison purposes.

The Florida State Water Policy, outlined in Chapter 17-40 of the Florida Administrative Code, establishes a goal of 80% annual reduction of stormwater pollutant loadings by stormwater management systems. Of the stormwater management systems listed in Table 8, only dry retention systems, with 0.5-inch of runoff retained, meet the State Water Policy goal of 80% reduction in annual pollutant loadings to the system. Off-line retention/detention facilities meet the 80% reduction goal for total phosphorus, TSS, BOD and total zinc, but provide only a 60-75% annual pollutant reduction for total nitrogen, copper and lead. Wet detention systems can meet the 80% reduction goal for TSS only, with removal efficiencies from 40-50% for total nitrogen, total phosphorus and BOD. Dry detention with filtration systems meet the 80% reduction goal for total lead only and provide virtually no pollutant removal for total nitrogen, total phosphorus and BOD. Based on the available literature, dry detention with filtration systems were found to exhibit a high degree of variability in estimated removal efficiencies. The actual removal efficiencies achieved by dry detention with filtration systems are a function of the relationship between the underdrain system and the seasonal high groundwater table.

TABLE 8
COMPARISON OF TREATMENT EFFICIENCIES
FOR TYPICAL STORMWATER MANAGEMENT
SYSTEMS USED IN FLORIDA

TYPE OF SYSTEM	ESTIMATED REMOVAL EFFICIENCIES (%)						
	TOTAL N	TOTAL P	TSS	BOD	TOTAL Cu	TOTAL Pb	TOTAL Zn
Dry Retention							
a. 0.25-inch retention	-60	-60	-60	-60	-60	-60	-60
b. 0.50-inch retention	-80	-80	-80	-80	-80	-80	-80
c. 0.75-inch retention	-90	-90	-90	-90	-90	-90	-90
d. 1.00-inch retention	-95	-95	-95	-95	-95	-95	-95
e. 1.25-inch retention	-98	-98	-98	-98	-98	-98	-98
Off-Line Retention/Detention	-60	-85	-90	-80	-65	-75	-85
Wet Retention	-40	-50	-85	-40	-25	-50	-70
Wet Detention	-25	-65	-85	-55	-60	-75	-85
Wet Detention with Filtration	0	-60	-98	-99	-35	-70	-90
Dry Detention	-15	-25	-70	-40	-35	-60	-70
Dry Detention with Filtration	0	0	-75	0	-65	-90	-25
Alum Treatment	-50	-90	-90	-75	-80	-90	-80

Based on the information provided in Table 8, the most effective stormwater management systems in terms of retaining stormwater pollutants appear to be dry retention, off-line retention/detention ponds, wet retention, and wet detention systems. The use of these types of systems should be emphasized to maximize the pollutant removal effectiveness for stormwater management systems.

Based upon the literature review, there is little evidence to indicate that filter systems improve the operational performance of stormwater management systems. In fact, much of the research indicates that filter systems may actually degrade the pollutant removal effectiveness of either a wet detention or dry detention system. In addition, filter systems must be routinely maintained to continue the proper hydraulic performance of the system. In view of the poor pollutant removal effectiveness of filter systems, and the continuing maintenance problems associated with these systems, the use of filter systems with wet detention or dry detention ponds should be discouraged.